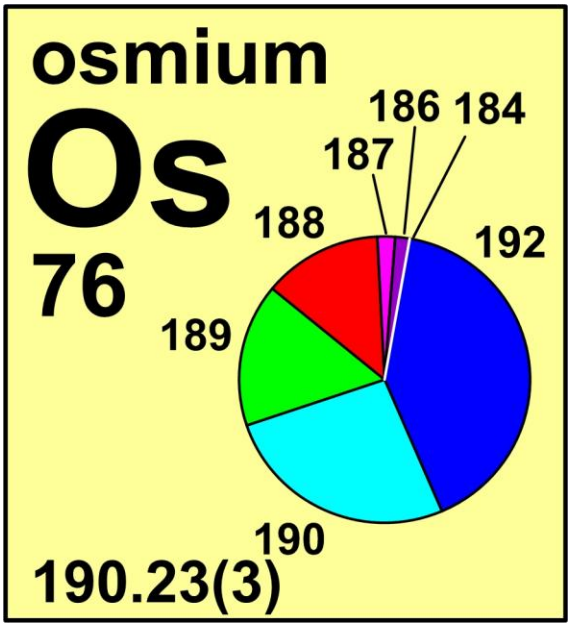
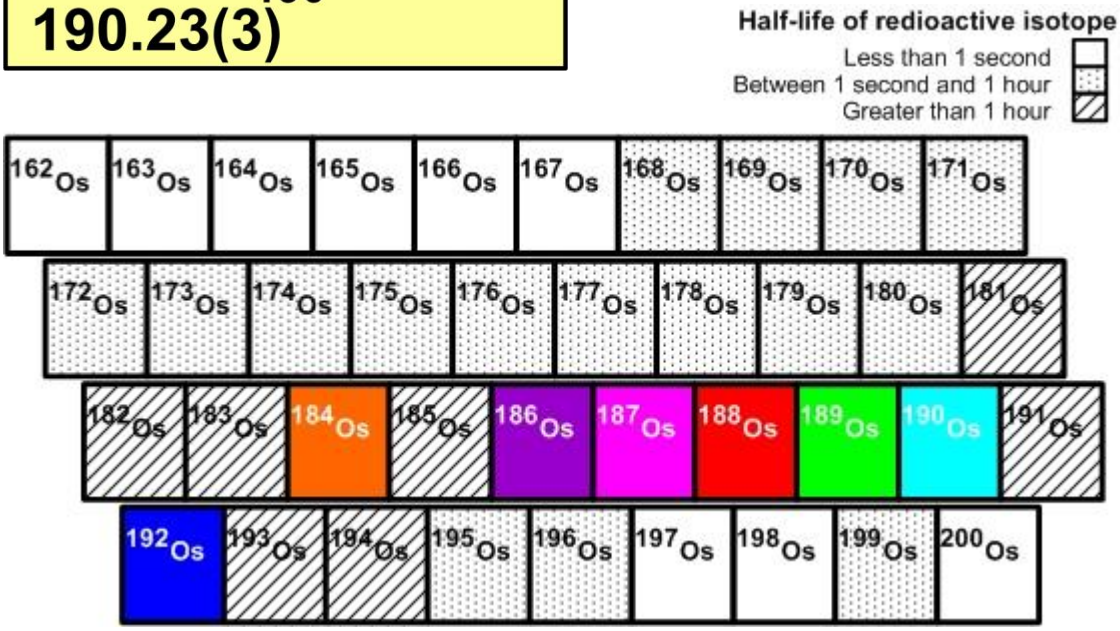
osmium



Stable isotope	Atomic mass*	Mole fraction
^{184}Os	183.952 4891	0.0002
^{186}Os	185.953 8382	0.0159
^{187}Os	186.955 7505	0.0196
^{188}Os	187.955 8382	0.1324
^{189}Os	188.958 1475	0.1615
^{190}Os	189.958 447	0.2626
^{192}Os	191.961 4807	0.4078

* Atomic mass given in unified atomic mass units, u.



Important applications of stable and/or radioactive isotopes

Isotopes in medicine

1) ^{192}Os can be used for the production of the medical radioisotope ^{195}Pt.

Isotopes in geochronology and earth processes

1) Some ^{187}Os is radiogenic, having formed by beta decay of radioactive ^{187}Re with half-life 4.2 x 10^{10} a. Variations in the ^{187}Os/^{186}Os and ^{187}Re/^{186}Os ratios are used for geochronology, for example to determine the ages of the Earth, moon, and meteorites. Because Re tends to be most

concentrated in metallic phases, this method is commonly used to date iron meteorites and some types of terrestrial ore deposits.

2) Variations in the $^{187}/^{186}$Os ratio can be transferred from rocks to fluids such as magmas and groundwaters, providing a useful tracer for fluid sources and migration paths. Meteorites and meteorite dust impacting the Earth have different Os isotope ratios than terrestrial rocks and sediments, such that ^{187}Os/^{186}Os studies provide evidence of continuing extraterrestrial additions to the Earth over geologic time, as well as a method for prospecting in the sedimentary record for large meteorite impact events that may have affected life on Earth.

Figure 1: Artistic rendition of a major impact event (extraterrestrial object striking the Earth). Deposition of debris from the incoming object could cause anomalous ^{187}Os/^{186}Os ratios to appear in thin layers of sediment on Earth.

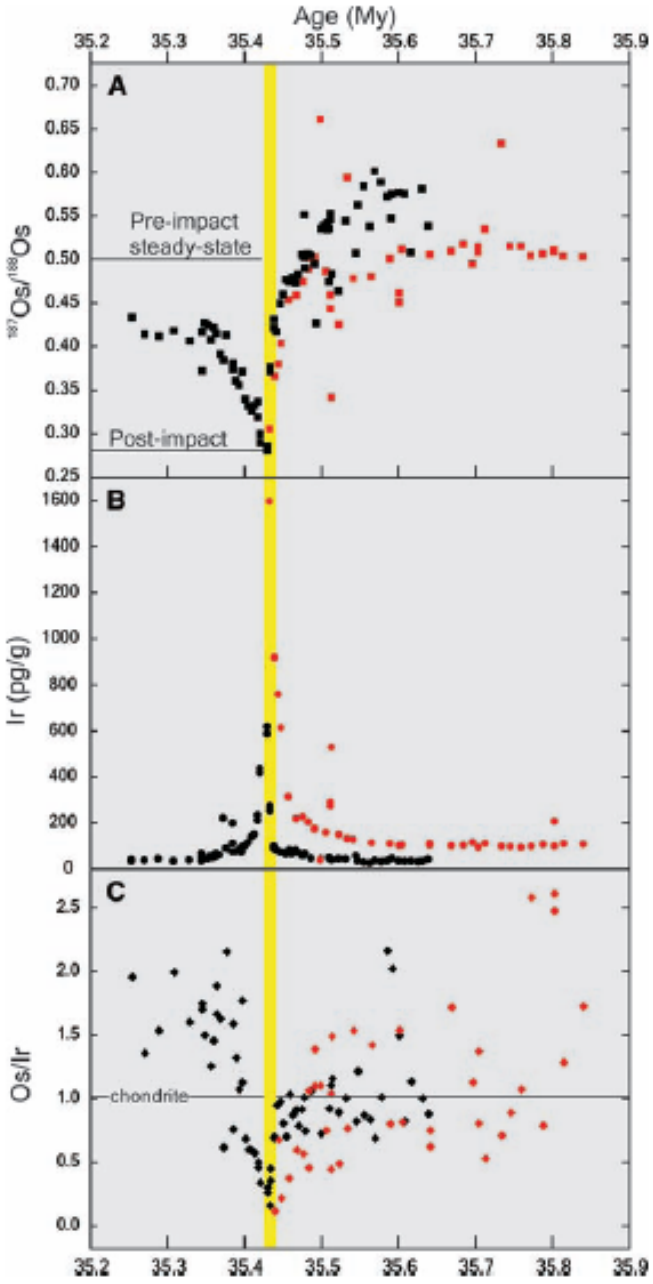


Figure 2: The graph shows an abrupt decrease in this ratio in marine sediments deposited around 35 million years ago, consistent with other evidence for a major impact event at that time. The magnitude of the Os isotopic anomaly may be related to the size of the impacting body, though with large uncertainties.